

CLAIMS

1. A substrate processing apparatus, comprising:

a processing chamber which provides a space for flowing desired gas and for depositing a desired film on a substrate;

a lamp unit group having at least one lamp unit which is disposed in the processing chamber and which includes a filament for heating the substrate and a lamp tube surrounding the filament;

at least first and second casings which surround the lamp unit, the first casing surrounding the lamp unit and the second casing surrounding the first casing; and

a refrigerant flowing apparatus for flowing cooling medium to a first space formed between the lamp unit and the first casing, and to a second space formed between the first casing and the second casing.

2. A substrate processing apparatus as recited in claim 1, comprising:

a controller which controls the refrigerant flowing apparatus such that an amount of cooling medium allowed to flow into the second space is greater than an amount of cooling medium allowed to flow into the first space at least while the substrate is being processed in the processing chamber.

3. A substrate processing apparatus as recited in claim 2, wherein

control is exercised such as to flow the cooling medium into the second space at a constant flow rate and to flow the cooling medium into the first space while varying a flow rate.

4. A substrate processing apparatus as recited in claim 1, comprising:

a controller which controls amounts of cooling medium flowing into the first and second spaces such that a temperature of the first casing is lower than a temperature of the second casing at least while the substrate is being processed in the processing chamber.

5. A substrate processing apparatus as recited in claim 4, wherein

the temperature of the first casing is controlled to be in a range of 300 to 500°C.

6. A substrate processing apparatus as recited in claim 4, wherein

the temperature of the second casing is controlled to be equal to or less than 200°C.

7. A substrate processing apparatus as recited in claim 1, wherein

different cooling mediums are respectively flowed into the first space and the second space at least while the substrate is being processed in the processing chamber, and a cooling efficiency of the cooling medium flowing into the second space is higher than a cooling efficiency of the cooling medium flowing into the first space.

8. A substrate processing apparatus as recited in claim 1, comprising:

a controller which controls the refrigerant flowing apparatus such that the flow rate of the cooling medium is greater in a process in which a temperature of the substrate located in the processing chamber is increased than in a process in which the temperature of the substrate is lowered.

9. A substrate processing apparatus as recited in claim 8, wherein

control is exercised such that an amount of the cooling medium flowing into the second space in the process in which the temperature of the substrate is increased is the same as in the process in which the temperature of the substrate is

lowered, and an amount of the cooling medium flowing into the first space in the process in which the temperature of the substrate is lowered is greater than in the process in which the temperature of the substrate is increased.

10. A producing method of a semiconductor device, comprising a step of,

using a substrate processing apparatus, comprising:

a processing chamber which provides a space for flowing desired gas and for depositing a desired film on a substrate;

a lamp unit group having at least one lamp unit which is disposed in the processing chamber and which includes a filament for heating the substrate and a lamp tube surrounding the filament;

at least first and second casings which surround the lamp unit, the first casing surrounding the lamp unit and the second casing surrounding the first casing; and

a refrigerant flowing apparatus for flowing cooling medium to a first space formed between the lamp unit and the first casing, and to a second space formed between the first casing and the second casing,

depositing a desired film on the substrate.